

### **ABSTRACT**

An ion-ion plasma source, that features a processing chamber containing a large concentration of halogen or halogen-based gases. A second chamber is coupled to the processing chamber and features an electron source which produces a high energy electron beam. The high energy electron beam is injected into the processing chamber where it is shaped and confined by a means for shaping and confining the high energy electron beam. The high energy electron beam produced in the second chamber when injected into the processing chamber ionizes the halogen gas creating a dense, ion-ion plasma in the processing chamber that is continuous in time. A method for creating an ion-ion plasma continuous in time.